

DIFFUSION BARRIER LAYERS AND METHODS OF FORMING SAME

This application is a divisional of 09/146,866, now U.S. Pat. No 6,323,081.

Field of the Invention

The present invention relates to semiconductor devices and the fabrication
5 thereof. More particularly, the present invention pertains to diffusion barrier layers.

Background of the Invention

In the fabrication of integrated circuits, various conductive layers are used.
For example, during the formation of semiconductor devices, such as dynamic
10 random access memories (DRAMs), static random access memories (SRAMs),
ferroelectric (FE) memories, etc., conductive materials are used in the formation of
storage cell capacitors and also may be used in interconnection structures, e.g.,
conducting layers in contact holes, vias, etc. In many applications, it is preferable
that the material used provide effective diffusion barrier characteristics.

For example, effective diffusion barrier characteristics are required for
conductive materials used in the formation of storage cell capacitors of memory
devices, e.g., DRAMs. As memory devices become more dense, it is necessary to
decrease the size of circuit components forming such devices. One way to retain
storage capacity of storage cell capacitors of the memory devices and at the same
20 time decrease the memory device size is to increase the dielectric constant of the
dielectric layer of the storage cell capacitor. Therefore, high dielectric constant
materials are used in such applications interposed between two electrodes. One or
more layers of various conductive materials may be used as the electrode material.
However, generally, one or more of the layers of the conductive materials used for
25 the electrodes (particularly the lower electrode of a cell capacitor) must have certain
barrier properties and oxidation resistance properties. Such properties are
particularly required when high dielectric constant materials are used for the